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It is announced that the Carnegie Foundation for the Advancement of Teaching has undertaken to grant pension allowances to the director and faculty of the Carnegie Institute of Technology and also to the directors of the Carnegie Museum and the Carnegie Department of Fine Arts, and such of their curators as do teaching work, under the rules and regulations of the foundation.

THE School of Physiology, presented to the University of Cambridge by the Drapers' Company was opened by Prince Arthur of Connaught on June 9. The cost of the building, with the contribution made by the company towards its equipment, has amounted to £23,500.

ON June 3 the University of Missouri celebrated the seventy-fifth anniversary of its founding. Addresses were delivered on this occasion by former Governor David Rowland Francis, president of the board of curators, Albert Ross Hill, president of the university, the Hon. William Rock Painter, lieutenant governor of Missouri, the Hon. William Prentiss Evans, state superintendent of public schools, Frederick Aldin Hall, acting chancellor of Washington University, David Francis Houston, secretary of agriculture, Harry Burns Hutchins, president of the University of Michigan, and Cassius Jackson Keyser, professor of mathematics in Columbia University. On the following day, President Lowell, of Harvard University, delivered the commencement address, and the degree of doctor of laws was conferred on President Lowell, Secretary Houston, Professor Keyser and Mr. William Mack.

DR. ARTHUR KENYON ROGERS, professor of philosophy at the University of Missouri, has been called to Yale University to succeed Professor William E. Hocking, who goes to Harvard University.

ASSISTANT PROFESSOR WILLIAM D. HARKINS, of the department of chemistry at the University of Chicago, has been promoted to an associate professorship in chemistry.

DR. C. H. SHATTUCK, head of the department of forestry at the University of Idaho, was re-

cently elected dean of the college of letters and sciences of that institution.

MISS JESSIE Y. CAUN, Ph.D. (Columbia), head of the department of chemistry, Rockford College, Rockford, Ill., has accepted an instructorship in chemistry at the University of Illinois.

DISCUSSION AND CORRESPONDENCE

SOVEREIGNS AND THE SUPPOSED INFLUENCE OF OPPORTUNITY

A SERIOUS criticism has been made of my theory that the high intellectual qualities found in royal families are the results of natural and sexual selection and inherent in differences in the germ-plasm. My belief is that differences of opportunity may have played some rôle, but my contention is that all the evidence we possess points in the opposite direction, and the conclusion is that differences in opportunity have been on the whole of comparatively trivial importance.

One of the eight reasons in support of this theory, which I have given in "The Influence of Monarchs" (New York, 1913), page 258, is that "younger sons of kings are not less eminent than heirs to the throne." By eminent I mean of high intellectual grade. For this statement I drew upon statistics published in "Heredity in Royalty" (New York, 1906), page 285, and again here presented in Table I. below.

TABLE I

Grades.....	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	Total
Total number in each grade.....	7	21	41	49	71	70	68	43	18	7	395
Succession inheritors	5	14	26	31	49	38	45	23	12	4	247
Per cent.....	71	67	63	64	69	54	67	54	67	57	62.5

These 395 persons were the 395 adult males 25 years or over who were graded for intellect in "Heredity in Royalty," pages 20-26. About three fourths of these individuals belong as descendants in the direct male lines of families studied. The other quarter enter the lists as ancestors, usually direct ancestors, in the various maternal lines. As far as one

can see from this table there is no tendency for the mentally superior grades (8), (9), (10) to be filled with succession inheritors.

It is thus seen that from 54 to 71 per cent. inherited the succession in the different grades. The upper grades are in no way composed of men whose opportunities were enhanced by virtue of this high position. Thus we see that a certain very decided difference in outward circumstances—namely, the right of succession—can be proved to have no effect on intellectual distinction, or at least so small as to be unmeasurable without much greater data.

The criticism which I have received comes in the form of a private letter from Professor J. McKeen Cattell and is so much to the point that it has called for the reinvestigation which I am here giving. The criticism is as follows:

It seems to me that the figures in your table ("Royalty," p. 285) may be explained by the fact that the monarchs attaining (9) and (10) come from a smaller group than those who are not monarchs. The encyclopedias would note all those attaining ranks (9) or (10) whether monarchs or not. The heredity being the same, the non-monarchs should, on your hypothesis, supply a larger number in these grades. As the monarchs supply one half of the (9) and (10) grades (there appears to be an error in the percentage under (9)¹) it follows that their grade was increased by their office. In grades (1) and (2), on the other hand, monarchs would be more likely to be included than other members of royal families.

It will be at once seen that this criticism is directed towards two points which I had not at that time determined—(1) what are the chances that an adult male member of the families studied will succeed to the throne. In other words, what is the per cent. of sovereigns to non-sovereigns when all adult males are considered? (2) What allowance should be made for the "obscure" princes or sovereigns? How many of these are there and is their presence such as to introduce a significant error?

It is not surprising that one unacquainted with royal genealogies should suppose that

¹ This is a typographical error. The 8 should read 12.

the total number of reigning sovereigns should be less than the total number of younger brothers (non-inheritors of the succession). The House of Hanover in modern England would give one this false impression. Here 20 adult males furnish but 6 reigning sovereigns. But the precise record of all the direct lines included in my study shows that this is a marked exception. On the average a little more than half of the males (who live to be 25 years) have become reigning sovereigns by inheritance. This is due to the fact that, in spite of the high fecundity in royal families, during the period studied, the adult males average only between 2 and 3 (2.33 in Table II.) in each "fraternity." There are many instances where a sovereign succeeds his brother, and this brings the proportion to more than one in two.

The percentage 62.5 for succession inheritors, in the table given above, is somewhat higher than that given for the table below perhaps in part because the table above included maternal grandfathers. These are sometimes of houses of less importance and grandeur than the great houses that form the chief male lines. It is probable that they are not often younger sons, consequently they are more apt to be sovereigns. Be that as it may it makes no difference since an accurate and systematic table is now prepared. These figures which are given below (Table II.) deal with the 832 adult persons who are in the male lines in "Heredity in Royalty." 403 of these are males. 220 or 54.6 per cent. became sovereigns by inheritance. The genealogy which I have used is the exhaustive and authoritative "Genealogie der in Europa regierenden Fürstenhäuser" by Dr. Kamill von Behr. It contains the direct lines of all the "Reigning Sovereigns" families of the present day. These are the same as found in the "Almanach de Gotha," *Première Partie*, but the "Genealogie" of von Behr traces them back as far into the past as possible. Von Behr does not include the non-reigning families, found in the "Almanach de Gotha," *Deuxième Partie*. These mediatised German royal families have the rights of equality of

birth with the reigning sovereign houses, but have not reigned since the Napoleonic era. It is easy to tell the actual sovereigns in von Behr as they are printed in capital letters. These are not always kings; a few are of ducal and princely royal houses, but even here some inherit the succession as sovereigns while others do not. With the exception of Montmorency (6 members) all the persons in the following tables are of strictly royal families.

Of the 403 persons in Table II., 94 are "obscure"; that is, not enough could be easily found out about them to warrant grading them for intellect in a scale of 10. More careful researches than I have yet been able to make, would doubtless reduce the number

TABLE II

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Sovereigns by inheritance.....	5	9	24	23	44	30	39	16	7	4	201
Non-sovereigns....	1	9	9	12	18	22	16	12	6	3	108
Probable distribution of "obscure" sovereigns.....			1	7	10	1					19
Probable distribution of "obscure" non-sovereigns...	1	2	11	20	32	7	2				75
Corrected sovereigns.....	5	9	25	30	54	31	39	16	7	4	220
Corrected non-sovereigns.....	2	11	20	32	50	29	18	12	6	3	183
Per cent. of sovereigns.....	71	45	56	48	52	51	68	57	54	57	54.6

of the "obscure," but I have always felt that this was not necessary to secure the conclusions which have been obtained. It is not necessary to secure the heredity correlations, and now it appears that the error which this introduces is not significant for the present inquiry. Of these 94 obscure members, 19 are sovereigns and 75 are non-sovereigns. The sovereigns are almost certainly and non-sovereigns probably, not worthy of grades (8), (9) or (10). They would probably form a curve of distribution about the grades (4) and (5). The non-sovereigns would find their center a little higher and spread out a little more. They are approximately arranged in the third and fourth horizontal columns.

Now it can be seen that grades (3), (4), (5)

and (6) as they appear in the uncorrected horizontal columns, at the top of Table II., will stand the introduction of a number of non-sovereigns without dismissing the 54.6 per cent. which is the average. Can these 94 "obscure" members be placed in Table II. without overbalancing the results? The reader will see that they can. For although the 75 "obscure" non-sovereigns count against my thesis, the 19 "obscure" sovereigns count in its favor; and all added together give a confirmatory result. In the previous investigation there were about 62 per cent. in each grade, who were sovereigns; now there are about 54. The truth of the whole matter is, that while there are, in the second research, a large number of (4) and (5) grades among the sons, in the previous research these mediocre persons were represented in the ancestry. The previous statistics could not settle the question of how many there were who were "obscure." The present research does settle the point, since it takes them up one by one and counts them all, in a series of "fraternities" one generation after the other.

Those who look carefully will see that there is a slight tendency for the sovereigns to run to the higher grades, but such a tendency is negligible for two reasons, even if a much larger total should make it exceed the probable error. Those who have inherited the throne must, on the average, have lived slightly longer than those who have not. A long life must favor the chances of inheritance. If the sovereigns have been longer lived, then they have had that much more time in which to distinguish themselves. Another point is that for all forms of genius (painters, poets, scientists, authors, etc.) and for the mentally abnormal as well, it has been claimed that the probabilities favor the firstborn beyond chance expectation. But some of these results have been questioned.

At any rate this does not concern the contention which I have made that there is no marked or easily measurable influence of opportunity on sovereigns, at least as arising from their official position.

Here then is an attempt to measure the rela-

tive influence of heredity and environment, not in a general, but in a special way. As I have been pointing out for several years, "the heredity *versus* environment" muddle can not be clarified except by making everything into problems of differences.

The study of the lower organisms may give for human heredity, very erroneous conclusions. The lower organisms are much more modified by environment than are the higher. If we are to make the science of eugenics accurate and accumulative, we must in every case, first decide what human differences, because of their importance, are interesting; then keeping the heredity factor constant, we should experimentally alter the environmental; or keeping the environmental the same, experimentally alter the heredity.

There can be no general answer to the time-honored controversy; but there may be a special answer to each separate, pragmatically conceived question. There may or there may not be. We can not tell until we try.²

Here it is not a general question whether opportunity has had any influence or not. It is a special one. Have we a right to say that there have been proportionately more great men among kings than among commoners because of the environment of kingship? The answer is that as far as we know at present the differences of environment have had absolutely nothing to do with it.

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OCCURRENCE OF BACTERIAL BLIGHT OF ALFALFA IN THE SALT LAKE VALLEY, UTAH

THE bacterial disease of alfalfa studied by Sackett¹ in Colorado has already done considerable damage in the Salt Lake Valley,

² For a fuller discussion see "Separating Heredity from Environment," *American Breeders Magazine*, Vol. II., No. 3, 1911, and "The Influence of Monarchs," pp. 227-229 and 290-293.

¹ Society American Bacteriologists, Boston meeting, December, 1909. *SCIENCE*, N. S., XXXI., 553, 1910. Colorado Agricultural Experiment Station Bull. 158, 1910.

Utah. So far as the writer knows, this disease, which is due to *Pseudomonas medicaginis* Sackett, has not been definitely reported from Utah, although Heald² states that "what appears to be a similar disease has also been reported from Utah, New Mexico, Nebraska and Kansas." There is sufficient evidence to warrant the statement that the bacterial blight of alfalfa has been prevalent in the Salt Lake Valley for some time, and, no doubt, the poor stands, as well as the many weak plants, are due to this disease. It is certain that this disease has caused more injury than the crown gall disease [*Urophlyctis alfalfæ* (v. Lagerh.) P. Magnus], recently reported by the writer as occurring in the Salt Lake Valley, and is certainly as injurious as the alfalfa weevil (*Phytonomus murinus* Fab.). In the past this disease has been mistaken for smoke injury due to the smelters, and it has also been reported as "alkali burn." That this disease could have escaped notice is singular, because the symptoms are as definite as those of the pear-blight disease.

The water-soaked, semi-transparent, yellowish to olive-green appearance of the stems, together with the presence of small droplets of a thick bacterial ooze and the weakened and partially drooping plants are the unmistakable symptoms of the disease in the incipient stages. Finally the stems become brownish-discolored or blackened, and very brittle. When the stems are attacked the foliage soon becomes chlorotic, finally turning a dirty white in severe cases. The leaves then become dry and brittle. When small pieces of the tissue of the diseased stems or leaves are mounted in water on a slide, enormous masses of the organisms may be seen by the naked eye issuing from the tissues. There is absolutely no difficulty in securing pure cultures.

The presence of the alfalfa weevil in the Salt Lake Valley is a factor in the distribution of this disease. While it is known that stomatal infections may occur, by far the greater number of infections take place through openings in the epidermis produced by insect punctures and severe frost injury. It has been noted that

² *Phytopathology*, Vol. II., No. 1, page 12.